WHAT IS CLAIMED IS:

1. A wireless hybrid peak-to-average reduction circuit for use with multi-carrier power amplifiers in a wireless communication system to enhance the linearity and performance of the amplifier, in particular wireless cellular, PCS, wireless LAN, line of sight microwave, military, and satellite communication systems and any other none wireless applications, the hybrid peak-to-average reduction circuit comprising:

   - A multi-carrier receiver for the hybrid peak-to-average reduction of IF or RF input signal to amplifier. If the input signal is baseband then the multi-carrier receiver is bypassed.

   - A digital signal processing block to peak-to-average reduce the multi-carrier input signal using amplitude clipping and phase rotation.

   - A digital signal processing block to use the amplitude clipped multi-carrier baseband signal to produce the phase rotation lookup table.

   - A digital signal processing block to converts the multi-carrier baseband input signal to individual carrier baseband signals. The individual carrier baseband signal is phase rotated before being up converted to its original multi-carrier baseband signal.

   - A digital signal processing block that clips the amplitude of the multi-carrier baseband signal by preserving the phase.

   - A multi-carrier transmitter block that prepares the peak-to-average reduced multi-carrier signal for delivery to multi-carrier power amplifier.

2. The hybrid peak-to-average reduction circuit according to claim 1, wherein main multi-carrier input signal from the wireless transmitter is sampled using sub-harmonic sampling technique at the input frequency or at an intermediate frequency.

3. The hybrid peak-to-average reduction circuit according to claim 1, wherein the multi-carrier input signal from the wireless transmitter is sampled using sub-harmonic sampling technique at the input frequency or at an intermediate frequency and the digitized multi-carrier input signal is down converted digitally and decimated to the appropriate number of samples per symbol for further digital signal processing.

4. The hybrid peak-to-average reduction circuit according to claim 1, wherein the multi-carrier input signal from the wireless transmitter is baseband and is sampled using Nyquist sampling technique and interpolated to produce the baseband multi-carrier signal with appropriate number of samples per symbol.

5. The hybrid peak-to-average reduction circuit according to claim 1, wherein the multi-carrier input signals from the wireless transmitter are in bit domain and the bit domain baseband signals are up converted, combined and interpolated to produce the digital multi-carrier baseband signal with appropriate number of sample per symbol.

6. The hybrid peak-to-average reduction according to claim 1, wherein the digital multi-carrier baseband signal is amplitude clipped without disturbing the phase.

7. The hybrid peak-to-average reduction according to claim 1, wherein the amplitude clipped digital multi-carrier baseband signal is converted to single channel baseband signals by digital down conversion. The individual baseband signals are phase rotated using the phase from phase rotation lookup table, then filtered and up converted back to their original baseband frequency

before all individual baseband signals being combined again to produce the multi-carrier peak-to-average reduced baseband signal.

8. The hybrid peak-to-average reduction according to claim 1, wherein the digital multi-carrier baseband signal is amplitude limited by a clipping circuit that calculates the amplitude and phase of the baseband signal. The amplitude of the baseband signal is clipped or is amplitude limited and then using the phase, converted back to complex baseband signal.

9. The hybrid peak-to-average reduction circuit according to claim 1, wherein the peak-to-average reduced signal is digitally up converted and converted to analog domain at an intermediate frequency or the output frequency.

10. The hybrid peak-to-average reduction circuit according to claim 1, wherein the peak-to-average reduction phase rotation lookup table is created using the individual baseband representative of the amplitude clipped multi-carrier baseband signal and the amplitude clipped multi-carrier baseband signal.

11. The hybrid peak-to-average reduction circuit according to claim 1, wherein the received signal strength of the input signal to hybrid peak-to-average reduction circuit and transmit signal strength of the output from the hybrid peak-to-average reduction circuit is dynamically measures to adjust the total gain of the peak-to-average reduction circuit zero

12. The hybrid peak-to-average reduction circuit according to claim 1 and subsequent claims, when it is used in wireless cellular, wireless PCS, wireless LAN, microwave, wireless satellite, none wireless amplifiers, and any wireless communication systems used for military applications.

13. The hybrid peak-to-average reduction circuit according to claim 1, wherein the DSP function can be implemented in programmable logic, FPGA, Gate Array, ASIC, and DSP processor